

A Tour of the Planets: Mercury Live Chat
Expert Dr. Renee Weber
March 5, 2012

Moderator Brooke: Welcome to our chat with Dr. Renee Weber as we view Mercury -- and some other planets -- through the streaming telescope tonight. Mercury will remain a little fuzzy because viewing from Earth is limited even with the most powerful telescopes...but you can see a plethora of high-rez images on the Mercury MESSENGER site at: http://www.nasa.gov/mission_pages/messenger/main/. So here we go -- looking forward to your questions

Micky: Is it that whatever i see in the video is Mercury?

Renee: Yes, the small dot is Mercury as viewed through a 14" telescope.

Micky: Is there any sound in the Video?

Renee: No sound, just video feed.

Leopac: Hi, all sky watchers

Renee: Greetings, feel free to jump in with your questions.

Pixiedust: Hi there , my question is why is mercury being blocked by the sun ?

Renee: Mercury is very close to the sun, from our perspective on Earth. The ideal viewing configurations only happen a few times a year, such as tonight.

(Moderator Brooke): As we go through the chat, we'll try to post some close-up versions of the planets as well. Here's a great dual image of Mercury in monochrome and color:

http://www.nasa.gov/mission_pages/messenger/multimedia/messenger_orbit_image20111005_1.html

Keko: What features makes Mercury unique in our solar system? or it's just a plane rock planet?

Renee: Mercury has several interesting features. First, it is a very dense planet, with a large metallic core, and besides Earth, the only terrestrial planet with an internally-generated magnetic field. It also hosts the largest impact basin in the solar system, known as Caloris Basin.

MScudder: What new space explorations are planned for Mercury and what will they research?

Renee: The MESSENGER mission is currently in orbit around Mercury. It is researching many aspects of Mercury including internal structure, surface composition, and magnetic properties. A planned future mission that is operated jointly by ESA/JAXA called Bepi-Colombo is also planned.

Pati: Hi Renee: , where can I find Mercury right now? In what part of the sky?

Renee: Look low on the western horizon.

Pixiedust: Does Mercury Have Moons, I mean it probely does but if so what ones?

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Renee: Mercury actually does not have any moons.

Apache720: Is it true Mercury does not rotate and that the same side always faces the sun?

Renee: Mercury does indeed rotate, but compared to Earth the rotation speed is very slow. One rotation period is about 58.7 Earth days.

(Moderator Brooke): Also from MESSENGER -- a "blue tongue" on Mercury:

http://www.nasa.gov/mission_pages/messenger/multimedia/messenger_orbit_image20120215_1.html

evaisa75: Hi, this is my question: Is NASA going to study Mercury's features as it was done with Mars?

Renee: MESSENGER is currently mapping and gathering data from orbit around Mercury, similarly as has been done for Mars. However, the surface environment at Mercury is too harsh for rovers.

VulcanPhysicist: What is the average surface temperature on Mercury?

Renee: The temperature range on Mercury is very large, with a minimum temperature around -300F, and a maximum of 800F.

(Moderator Brooke): Right now, Mercury has disappeared into haze, so on the Ustream feed, you're seeing a pre-recorded video from an hour ago. Soon we'll switch to a wide-field view of the western sky showing Venus and Jupiter -- then move the telescope over to the planet Venus. Stay tuned!

SoCal_viewer: Why is it's surface temp cooler than Venus'?

Renee: Mercury does not have an atmosphere to trap solar energy, so the range in day to night temps is very extreme.

JPMajor: What's the plan for MESSENGER after its 12-month orbital mission is completed? Will it be extended?

Renee: In November 2011, NASA extended the active mission by one year.

Capkirk: other question, mercury have cold land points?

Renee: Similar to the Moon, Mercury has permanently shadowed regions near the poles that are extremely cold.

Jim: How high is the orbit for the Messenger spacecraft around Mercury.

Renee: MESSENGER is in an elliptical orbit with closest approach of approximately 120 miles above the surface.

MWilson: What unusual/interesting fact can I tell my 4th grade class about Mercury?

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Renee: Also, if you were to stand on the surface of Mercury, the sun would appear 2 and a half times bigger than how it appears on Earth.

evaisa75: Is it true that there is ice on Mercury?

Renee: It is possible that ice exists in the permanently shadowed regions/craters near the poles.

(Moderator Brooke): On the Ustream feed -- behold the lovely planet Venus! You can really see the effects of the atmosphere. The "waving" is caused by atmospheric motion here on Earth.

ibrahim.mounir: Hey why is the picture so blurry and is there going to be anyother views of Mercury

Renee: The blurry picture is caused by the Earth's atmosphere. It is very difficult to observe Mercury from Earth, which is why spacecraft like MESSENGER are so valuable in helping us learn more.

Rdemersaz: Are there areas that have consistently moderate temperatures?

Renee: The lack of an atmosphere creates an extremely harsh environment, so the days are very very hot and the nights are very very cold, with no in-betweens!

VulcanPhysicist: What is the current distance between Earth and Mercury?

Renee: It's about 83 million miles right now.

AjithKamath: Does there exist any records about large variations in the magnetic field of mercury. over time as it is noted about the magnetic field intentsity of eth having changed drastically with time.

Renee: The current magnetic field is weak compared to Earth, but recently-observed remnant magnetization of the surface suggests the field may have been stronger in the past.

Micky: Can we get a live feed from MESSANGER

Renee: MESSENGER data is not transmitted live, unfortunately.

(Moderator Brooke): A color close-up of Kuiper crater on Mercury:
http://www.nasa.gov/mission_pages/messenger/multimedia/messenger_orbit_image20120213_1.html

Amcknig: Has Messenger found any evidence of recent geological activity on Mercury?

Renee: Like the Moon, Mercury is not thought to have plate tectonics similar to what we observe on Earth. MESSENGER has imaged some tectonic-like features such as troughs and ridges that may have formed as a result of crustal contraction as the planet cooled through history.

Bev: How do they observe the remnant magnetism?

Renee: MESSENGER has a magnetometer that measures the magnetization of the surface rocks.

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(Moderator Brooke): A little love for Venus -- a computer-simulated global view from NASA/JPL:
<http://www.nasa.gov/topics/solarsystem/features/pia00104.html>

Jim: How many earth days does it take from noon to the next noon on Mercury.

Renee: The solar day on Mercury is approximately 176 Earth days!

Turisops: trying to duplicate this on my telescope...are you using any color filters??

Renee: No filters are being used on the telescope.

Jazzysan: Is a lander mission possible (non-manned like the Mars rovers obviously), and if so are there any conceptual plans for one?

Renee: Only orbital missions are planned at this time. The harsh environment at Mercury provides a technological challenge to surface missions.

WladRascian: Are there any active volcanoes on Mercury? How does our star effect its geologic activity?

Renee: There is evidence of past volcanic activity on Mercury, similar to our Moon. The gravitational interaction between the Earth and the Moon was known to trigger moonquakes, which were measured during the Apollo missions. It's possible that the Sun's gravitational influence on Mercury could induce similar quakes, but without seismometers on the surface, we have no way to tell.

Abby101: What created the craters on Mercury?

Renee: Like the Moon, Mercury is heavily cratered due to meteor impacts on the surface.

Starlessnight: Is Mercury's core solid?

Renee: Current evidence suggests that Mercury's core is at least partially molten.

Jaxgismo: i i am doing a school project on Mercury and i have a question Who discovered Mercury?

Renee: The earliest known recorded evidence of Mercury was found on some Assyrian tablets around 14th century BC.

Apache720: Is there gravatational pull on Mercury? If so, what is it's ratio to Earths?

Renee: Surface gravity at Mercury is approximately 1/3rd of Earth surface gravity.

Pati: I see you focus on planetary seismology. Can you measure anything on Mercury without being able to placing a seismometer there?

Renee: I don't think so! Traditional seismic measurements require stations deployed on the surface. An emerging field of atmospheric seismology may be used to detect surface waves on planets with

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atmospheres (such as Venus) but unfortunately the lack of an atmosphere on Mercury makes this type of science also inaccessible.

(Moderator Brooke): Thanks for the great questions, everyone, and thanks for staying on-topic. It's appreciated!

Amcknig: we wish the links were working! We can't even copy them and paste into a browser.

Renee: We're looking into it, sorry!

Darioush: Excuse me, did you say the rotation period is 58.7 Earth days? Or much more?

Renee: The rotation period is indeed 58.7 earth days, but because Mercury rotates only 3 times for every 2 trips around the sun, the actual "solar day" or times when the sun is visible at a fixed point on the surface, is much longer - 176 Earth days.

Apache720: What Chemical elements make up the atmosphere of Venus?

Renee: The atmosphere of Venus is 96.5% CO₂ (carbon dioxide) and 3.5% N₂ (nitrogen).

AnaJ: Why does Mercury look whitish and fuzzy?

Renee: The white color is due to reflected sunlight, while the fuzzy-ness is caused by the Earth's atmosphere. Mercury is very close to the horizon right now, so there is comparatively more atmosphere to look through. That's why Venus looks slightly less fuzzy -- because it is higher in the sky.

VulcanPhysicist: What is the optical design of this 14" telescope? Cassegrain, Ritchey-Cretien, Mak-Cass, Dobsonian, Newtonian, reflector, etc.

Renee: 14" Celestron Cassegrain on a paramount.

SmilinSean: how big is venus compared to earth?

Renee: Venus is nearly the same size as Earth, its equatorial radius is 95% that of Earth.

Gismo: what is mercurys gases made of? and what space missions have been to mercury and what was the first mission/name

Renee: Mercury has an exosphere (very very thin atmosphere) consisting of oxygen, sodium, hydrogen, and helium. The only previous mission to Mercury was Mariner 10 in the 1970s.

(Moderator Brooke): Jupiter is looking pretty good on the Ustream...

Paulrc: how fast does jupiter rotate? will the red spot rotate into view tonight?

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Renee: Jupiter's rotation period is 9.9 Earth hours. The red spot will next be visible at 8:37PM central time tonight.

SmilinSean: What is the great red spot on Jupiter?

Renee: It's a large atmospheric storm about the same size as planet Earth! And it has been going on for hundreds of years!

Apache720: Does Jupiter have a solid surface or is the entire planet comprised of gas?

Renee: it probably has a small solid core, but beneath the atmosphere Jupiter mostly consists of liquid metallic hydrogen and helium.

(Moderator Brooke): Hey everyone -- really sorry about the HTML links we've been posting. The IT folks are working a solution for later chats, but for right now, there's not a way to cut and paste the text easily into a browser. For Mercury, a simple link is http://www.nasa.gov/mission_pages/messenger/main/, then go to the image gallery. Sorry for the inconvenience!

SoCal_viewer: Lacking an atmosphere, what's the difference between surface and orbital missions?

Renee: A "surface" mission would mean, actually landing on the surface. An "orbital" mission can study the surface, but only remotely. Bodies lacking an atmosphere are more difficult to land on remotely, because we can't rely on airbags like we did for Mars.

SmilinSean: how long ago were the planets formed? were the gas giants formed first, last, or about the same time?

Renee: Gas giants were formed first, followed by the terrestrial planets. However they were likely all formed within a few hundred million years of each other.

astro_quebec: Is there a correlation between a planet's size and its distance from the Sun ?

Renee: There doesn't seem to be. Saturn and Jupiter are the biggest, but they are not the farthest away.

Apache720: How many moons does Jupiter currently have and do any have an atmosphere similar to Titan?

Renee: Jupiter has 66 known moons, with the most recent discovered in 2011. To the best of my knowledge, none possess atmospheres like Titan. It is a very unique moon.

Dazza_Gee_NZ: How well does this Ustream view of Jupiter compare to what the eye-piece view through the 14 inch scope would look like?

Renee: They are about the same.

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VulcanPhysicist(C): How strong is the gravitational pull on Jupiter as it is almost 12 times earth's diameter?

Renee: In response to VulcanPhysicist: the "surface" gravity at Jupiter is about 2.4 times that of Earth.

Amgreenwald: how long after the sun dips below the horizon should i be looking for mercury? @ dusk, or in darkness?

Renee: After sunset, Mercury should be viewable above the horizon for ~90 minutes. It will set tonight at about 7:15 central time -- just a few minutes left.

AjithKmth: does mercury's gravity intensity vary across its surface considerably

Renee: It does, in similar ways to slight surface gravity on other planets, related to structural features.

(Moderator Brooke): Sounds like Jupiter will have the starring role on Ustream until the bottom of the hour then our astronomers will be switching over to a view of Mars...

Voice09: why do other planets moons have names but ours is simply called the moon?

Renee: I would guess that it is because it is the first one ever observed by humans. The scientific name for "moon" is actually satellite, but the two are often used interchangeably.

Voice09: what is your favorite planet in our solar system and why?

Renee: My personal favorite is the Moon, but since that's not technically a planet, I'll go with Mars. I'm assuming you meant other than Earth, right? Mars has the biggest volcano in the solar system, which is pretty neat!

Rokhsare: sorry , how is the inch of this telescope ??

Renee: This is a 14" telescope.

(Moderator Brooke): Our astronomers have just gotten a great view of Venus up on the Ustream feed!

Hi_Mrs_Ludlow: I would really like to know when the next full solar eclipse will be

Renee: May 20th, 2012, there will be an annular solar eclipse viewable from the western US.

VulcanPhysicist: Which planet has the largest magnetic field? Which has the smallest?

Renee: Jupiter has the strongest magnetic field, and Venus has none!

Ldshinod: Is it safe to view Venus transit with naked eye?

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Renee: Never look at the sun with your naked eye -- you wouldn't be able to see it with your naked eye anyway! You need a telescope equipped with special filters to view a transit or Venus.

Dazza_Gee_NZ : That view of Venus is MUCH better than before (I know its a difficult planet to view) :)

Renee: We are lucky to have great viewing conditions right now!

Amcknig: I've always been curious about how the planets gravitational pull affects each other at what seem like astronomical distances :) That Neptune and in turn Pluto were discovered because a "wobble" in their orbits suggested the presence of the planet farther out. How much influence do the planets really have on each other?

Renee: It is true that all the planets interact with each other gravitationally. But the extreme distances make these variations quite small. For example, on the Moon, the Earth is the largest gravitational influence, followed by the sun, followed by Jupiter, but Jupiter's influence is orders of magnitude smaller.

Melinda_R: Hi Dr Weber!

Renee: Greetings, Melinda.

VulcanPhysicist: What are some interesting facts about Venus?

Renee: Venus experiences a retrograde rotation, which means that on Venus, the sun rises in the west.

Starlessnight: Is it possible with the right equipment to view Mercury pass in front of the sun like we can see Venus?

Renee: Yes, but Mercury transits are more rare.

drMattdr: How hot is Venus?

Renee: The average surface temperature is around 900F -- very very hot!

Melinda_R: I know that you have been working on gathering data from the moon and Mars. How much data does NASA currently have on Mercury in comparison to the moon and to Mars, and do we plan on gathering information from Mercury the same way we are doing it from the moon?

Renee: Since NASA has only sent 2 missions to Mercury so far, we have comparatively much less data from there. I would venture that we have the most data from the Moon, because it is the most easily accessible. After MESSENGER, NASA does not have any Mercury missions planned, although there is another mission coming out of the European Space Agency (called Bepi-Colombo).

Hi_Mrs_Ludlow : do you think man will ever land on Venus and if so about how long?

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Renee: The environment of Venus is very harsh, it is extremely hot and the atmosphere is toxic and very high pressure -- 90 times Earth atmospheric pressure! The Russians did send probes to the surface, but they only survived on the surface for a few minutes.

Spoo: is this scope at monte sano?

Renee: No, it is located on the Redstone Arsenal.

(Moderator Brooke): Hey everyone -- we're getting into the last 30 minutes of our chat, so if you have questions for Renee, this is a great time to get them into the queue...

Voice09: How long before you expect the moon to start developing Volcanoes?

Renee: The Moon had volcanic activity in the past, but these are dead today.

AjithKmth: which is the device used on spacecraft to sense the magnitude of gravity on the visited planet

Renee: Gravitational measurements are determined from the orbit variations of the spacecraft.

(Moderator Brooke): From our astronomers: the telescope is about to switch away from Venus and onto a view of Mars...

Clariph: Is there evidence that Mercury, at any point in its history, was in the habitable zone and capable of supporting life, or has it always been too close to the sun?

Renee: It has always been close to the sun. At best, in the distant past Venus may have been on the inner edge, depending on how the habitable zone is defined.

mounir31: Hello i was wondering is there any sort of plate tectonics on any of the planets we are seeing?

Renee: As far as we know, Earth is the only terrestrial planet that currently supports plate tectonics.

(Moderator Brooke): Mars is now up on the Ustream feed -- another great view from the astronomy team!

Rdemersaz: What is known, if anything, about the composition of Venus (core, mantel & crust)?

Renee: Venus is likely compositionally similar to the Earth, with a differentiated internal structure.

Pati: Did the Russians learn anything from those few minutes their probe was on Venus?

Renee: I believe the Russian probes did successfully return some photographs. I'm not sure what other instrumentation they carried.

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VulcanPhysicist: How does a Martian solar day compare to that of Earth? If humans ever live on Mars, would our circadian cycles be a problem?

Renee: The Martian day is ~37 minutes longer than Earth's day. But I would guess that the weaker gravity would be a bigger problem than the length of day!

SoCal_viewer: Has Mercury had any near misses with Comets in recent years?

Renee: Most comet orbits are known, and none have come close to Mercury recently. But other objects, like smaller meteorites could potentially impact the surface.

AjithKmth: Just out of curiosity, as mentioned above Venus is likely similar in composition to Earth but differentiated internal structure and earlier having read that Venus has no magnetic field, is there generally a link found between the internal structure of a planet and intensity of its magnetic field?

Renee: A planet typically must have a liquid, convecting metallic core to support magnetic field generation. So we can infer that bodies without magnetic fields likely have small, solid, and/or non-metallic cores.

Shoemeiste: Now that we are finding planets in other solar systems using Kepler, etc., how much of what we know about our solar system being used to understand these new finds? What were your first thoughts when we started discovering them?

Renee: We use what we know from our own solar system to define the "habitable zone" in which a planet can sustain life. Out of the many new planets recently discovered in other solar systems, only a small handful are in similar 'habitable zones.' I would love to be able to really 'see' these worlds...

SoCal_viewer: Thank you for all the information and the astronomers for the great views! Take care.

Renee: Thanks for tuning in! I hope you enjoyed the chat.

Rdemersaz: Many thanks to the chat team, and the astronomy team, for this wonderful program. My friends and I look forward to participating in future sessions.

Renee: Thanks to you too, we are always happy to answer questions!

(Moderator Brooke): We have about five more minutes scheduled in our chat, so time for just a few more questions.

Amcknig: Would it be right to assume that most of the Messenger photos in the gallery are of the hot side - several hundred degrees at the surface? There are some amazing views of scarps and craters to peruse there.

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Renee: Yes, photos are taken in daytime conditions, often from different illumination angles to best visualize the features.

Ale_Gallon: How beautiful! And thank you for chatting with us! :)

Renee: We hope you enjoyed the telescope views tonight!

Shoemeiste: Thanks Renee: and Brooke: !

Renee: Thank you too!

Melinda_R: Thank you for your time, Dr. Weber! ;)

Renee: My pleasure!

SoCal_viewer: really nice view of Mars

Renee: Thanks!

Thiago: how can I know better about Venus project that Russians did?

Renee: The missions were named "Venera" which may help you search for more info.

Dazza_Gee_NZ: Is this blurring that we are seeing the same thing that causes some bright stars to appear to flash and wobble, especially when down low near the horizon?

Renee: That is correct, it is called atmospheric turbulence.

Ozarker44: Well, darn. I clicked the "float or unfloat" icon and inadvertently lost the screen, and apparently my question on Olympus Mons and it's size in relation to the apparent lack of plate tectonics. Now it's almost time to close, but I've enjoyed the questions and answers and look forward to the next chat.

Renee: The large size of olympic mons is due to low surface gravity on mars. It is a "shield" type volcano.

Astro_Boy: Thank you very much for sharing this beautiful view with us and chatting, it was incredible!

Renee: Thanks for tuning in!

VulcanPhysicist: A big thank you Dr. Weber for answering qeustions tonight. A special thank you to the astronomy team from saving me setting up my telescope in frozen Northern Canada!

Renee: Brrrrr!!

Clariph: Thank you, Dr. Weber! This was very interesting.

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Renee: Thanks for tuning in!

(Moderator Brooke): Thanks to everyone for all of the excellent questions, and we hope you enjoyed viewing the planets tonight. Thanks to our chat expert, Dr. Renee Weber, and our excellent astronomy/multimedia team here at Marshall Space Flight Center: Bill Cooke, Rob Suggs, Rhiannon Blaauw, and Lee Erickson. Please check back on this page later in the week for a transcript of the chat. We hope to see you for our next chat on Mar. 25: the Venus-Jupiter conjunction. Have a great evening.

Ozarker44: Thanks Renee and Brooke!

Brooke: It was our pleasure -- thanks for being here tonight! :)

Rokhsare: Tanks alot I 've never seen this veiw

Brooke: You're very welcome!

Amcknig: Thanks so very much - what a great session!

Brooke: Thanks for being here -- we enjoyed it. :)